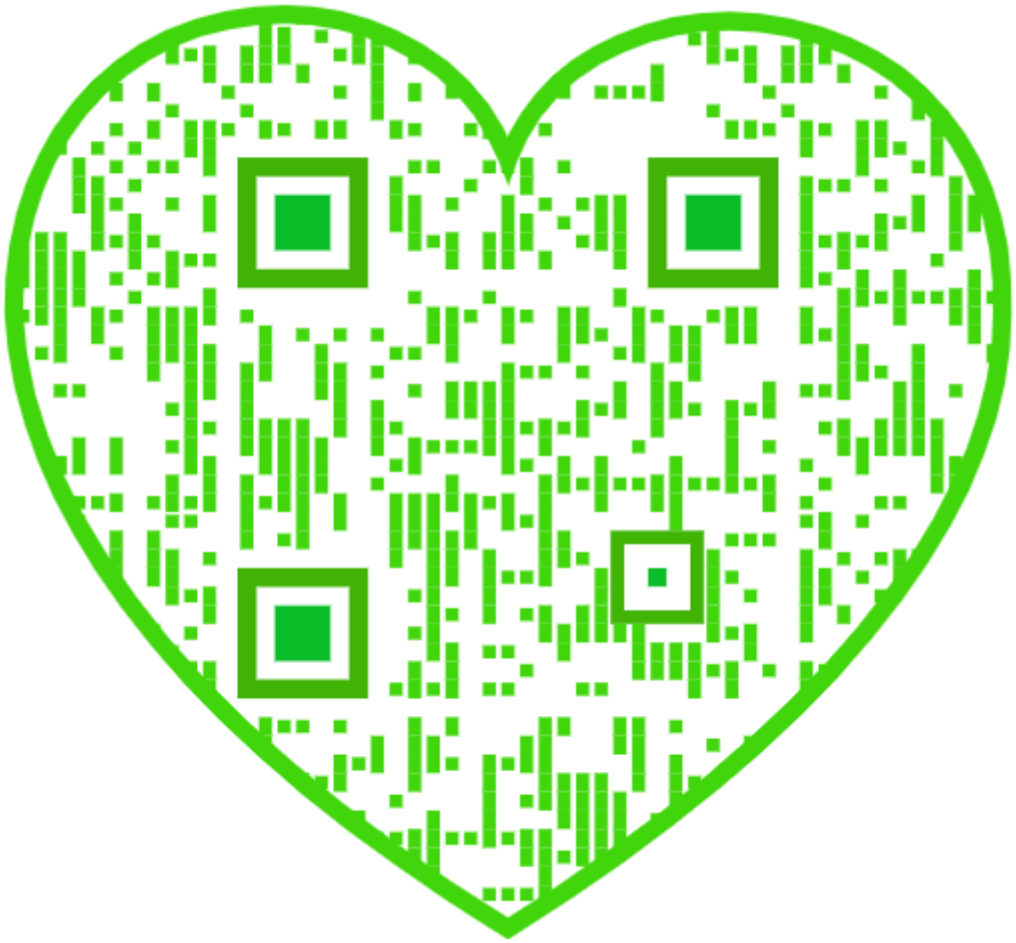
ELEMENTARY MYCOLOGY



ELEMENTARY MYCOLOGY

A FEW NOTES ON

MUSHROOMS

FOR BEGINNERS

TOGETHER WITH A CHART

BY MEANS OF WHICH ANYONE CAN SAFELY
GATHER ALL THE MUSHROOMS
THEY CARE TO EAT.

BY

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Introduction

I FEEL that perhaps an apology is due to learned botanical professors for my daring to allow "Elementary Mycology" to rise to the dignity of publication.

Let it be understood that I lay no claims to erudition in the subject and my apology and explanation are as follows:

Only comparatively recently was I introduced to the pleasure of "Mushroom Hunting," and can almost claim to be a novice.

This may, however, encourage others who might at first glance think the subject too deep and dangerous and intricate for them.

It's nothing of the kind. It is delightfully easy and I have found it charming and interesting to a degree. It has many advantages which are not found in other hobbies.

It costs nothing and it can be followed by anyone who has time to take a stroll.

It is interesting, because one is always finding new varieties and making charming friends and acquaintances amongst the mushrooms.

It is profitable, for many are the delectable morsels that can be gathered for food which would otherwise be passed by, and this without destroying life or harming God's creatures.

As a measure of protection to the lives of both themselves and their fellow creatures everyone should know how to identify the few dangerous varieties which, though often attractive in appearance, are yet deadly in their results if eaten by mistake.

This knowledge, I repeat, is very easy to acquire and I can assure you will repay many times over the time spent on it.

PART I.

ELEMENTARY MYCOLOGY

—or—

NOTES ON MUSHROOMS FOR BEGINNERS

"Is that a Mushroom or a **Toadstool?*" or "How do you tell a Mushroom from a Toadstool?"

That is invariably the first question asked.

It cannot be answered because it does not mean anything.

It presupposes a division into two classes.

Mushrooms—good to eat.

Toadstools—poisonous.

They are not divided in any such way. Toadstool and Mushroom are commonly really only different words for a gilled fungus with the Latin name "Agaricea."

There are all sorts, good, bad and indifferent, wholesome, poisonous, harmless, edible, inedible, full-flavoured, without flavour, or with an unpleasant flavour, digestible, indigestible and so on almost indefinitely with all sorts of combinations of these qualities. So this question in the above form cannot be answered.

Well, how do you know mushrooms? The small son of a friend asked me. How do you know your little playmates, Philip? I asked. "Oh, by their faces and things," he replied. Well, Philip that's how I know my friends and enemies too, amongst the mushrooms.

It is as easy to make a few friends amongst the mushrooms as it is to make friends amongst the fruits or flowers, only one must be properly introduced amongst the mushrooms, it is especially

*As to the significance of the word "Toadstool" I can find no light. I have come to the conclusion after much research that the only reliable authority must be the "toad" himself.

dangerous to pick up chance acquaintances or not to be sure.

There is no "Royal Road," a well-known writer poetically put it. "One must know their mushrooms like the woodsman knows his trees or the fisherman those species of fish that come to his nets."

I suppose few woodsmen know all the trees and few fishermen all the fish, but they know the kinds they are looking for. The same way with the Mushroom Hunter, and if he knows even half a dozen of our common varieties, he can go out almost any day, from early spring till it freezes up and gather all he can eat and have plenty more to give his friends—so abundant are they to be found, if one knows when and where to look for them.

Mushrooms, like fruit and flowers and trees, are of many kinds. These kinds are called Genera.

A certain fruit is called an apple, another a plum and plum and apple are their Generic names.

A certain Mushroom is called a Hypoloma, another a Coprinus, and Hypoloma and Coprinus in the same way are Generic names.

Just as there are many varieties of apples and many varieties of plums differing from one another in taste, edible qualities and appearance, so are there varieties of Hypolomæ and Coprini, some better than others. Yet one should never mistake an apple for a plum any more than one should mistake a Hypoloma for a Coprinus, for the difference is just as marked. One might, however, have more difficulty in distinguishing the variety of apple or variety of plum and in the same way with the Hypolomæ and Coprini. Some varieties of Hypolomaæ and some varieties of apples are better than others, but generally speaking all apples are edible and all Hypolomæ are edible.

Some fruits are poisonous and so are some mushrooms.

Some fruits not poisonous in themselves will not agree with some people. Some people cannot eat strawberries. Some, mushrooms in the same way.

Some people too like one kind, some another and prefer their favourite mushroom just as they do their favourite fruit or flower.

Most mushrooms are easily digested and agree well with most people and some, like the Corpinus, are exceedingly so, very tender, nutritious and have been fed to invalids when they could digest no other food. The only safe rule is to go slowly and eat only those varieties with which one has become thoroughly familiar.

One's list can be added to almost indefinitely and a beginner can very soon learn to distinguish a sufficient number of common edible varieties to enjoy a "Mushroom Feast" at any time, most months in the year.

Our woods and even our city boulevards and lawns teem with edible kinds and varieties from "Spring to Frost."

An increasing number of mushroom lovers or Mycologists, as they are called, are finding this out and interest in mushrooms is growing rapidly, due in large measure to the excellent books and works on mushrooms which have appeared in recent years.

It is a fascinating and profitable study and I hope the little chart I have prepared will be useful to beginners as a handy method of finding out the genus or kind of mushroom under investigation. After fixing the genus the edible qualities can be discussed and the variety of the species sought for.

Some kinds are all wholesome and good, such as

the Coprinus (or Inky Mushroom) the Morchellas (or Morels) Lycoperdales (or Puffballs) and so on.

In other Genera, some varieties are excellent, some unwholesome or even poisonous, some harmless but unpleasant and so on.

"A little knowledge is a dangerous thing" is a good maxim to apply to eating mushrooms, and especially to be avoided are the popular so-called "Rules by which one can tell a Mushroom."

They are all misleading and dangerous, and some are silly.

Some of the most poisonous varieties *peel* readily.

"Blackening a silver spoon" only means that the mushroom is in a more or less advanced state of decay.

"Having pink gills" is also dangerous as there are some mushrooms with pink gills amongst the Entolomæ, which are poisonous, and so on.

The only safe rule is to be entirely familiar with the name and edible qualities of each individual mushroom you propose to eat.

See also that it is not decayed or infested by worms.

The proper thing to do for those who merely wish, from time to time, to gather a few mushrooms to eat, is to learn to recognize a dozen or even half a dozen of our edible commoner varieties.

This is as simple and easy a thing to do as learning to recognize daisies, buttercups, dandelions or any of our common flowers.

Then, one can go out almost at any time and gather all one wants to eat, and at the same time pass as a "Mushroom Expert" amongst most of their friends.

In most cases you will then find that you are not satified with what you know but will continue to add more and more varieties to your list, as there is a considerable underlying interest in most people

in mushrooms, both because they like them to eat, and because of the spice of adventure they feel in gathering them. In this way the "Mushroom Fan" comes into existence.

There is one thing in particular that I think the novice mushroom gatherer should be warned against and it is, I believe, the most frequent cause of disaster.

That is, judging the edibility of a mushroom by its "appetizing appearance." Speaking off hand and laying down no rule in this respect, I might almost state that the more unappetizing and "toadstooly" looking an unknown species appears to the novice, the less likely he would be to get into trouble by eating it, and I will distinctly state that the most deadly poisonous amongst them are amongst the most appetizing looking of them all. Probably this unfortunate condition is the main underlying reason for the general distrust of mushrooms and, no doubt, is the cause of many deaths.

Again, speaking off-hand, I cannot think, at the moment of any mushrooms growing in clusters, that is in dense bunches, not merely scattered about in flocks, that are dangerously poisonous, although, of course, I do not lay this down as a safe rule either.

In addition to the Agariceæ or gilled mushroom there are many other edible fungi, such as:

*1. The Morchellas or Morels which have the cap-covered with a net-work of blunt ridges enclosing irregular depressed spaces instead of gills. None of the Morels are harmful or even suspicious. They are amongst those Genera of mushrooms that dry well and can be kept for winter use in the same manner that apples are dried.

2. The Lycoperdales or Puff-balls with which

*See Note 1 Chart

everyone is familiar and are all edible when quite fresh and big enough to be worth while.

The best, of course, being the Giant Puff-ball, Lycoperdon Giganteum, some of which become big enough to make a meal for a family. They make an excellent fungus to begin on. They should be cut in slices half an inch thick and fried.

3. Some of the Boleti, which are unmistakeably recognized by having tubes instead of gills and are very common in our woods through the hottest part of summer. Some of the Boleti were formerly looked upon with suspicion but McIlvaine says that he is convinced that "all Boleti are harmless, but some are too bitter to eat."

4. The Hydnaceæ or Hydnums or Tooth Mushrooms, having spines or teeth instead of gills, are also easily recognized. Much the same can be said of them as of the Boleti. Some are edible, some too tough, some bitter. I have heard of none that are poisonous.

5. The same might be said of the Clavaria or Coral Mushrooms which cook and taste something like cauliflower. They are easily recognized and good when young and tender.

6. The Tremellaceæ or jelly-like fungi, are sometimes good in soup, giving flavour and body. The Peziæ, or a Genus of mushroom without root or stalk, and others.

MUSHROOM POISONING

As already explained Mushrooms may simply disagree with some people and not with others. Also perfectly good mushrooms may upset a person through being worm infested or more or less decayed.

Again something else altogether may have disagreed with them, for which, of course, the mushrooms get the blame.

Apart altogether from these features some varieties of mushrooms contain certain vegetable alkaloids of a distinctly poisonous nature. While there are but few varieties which do contain these poisons the individuals of these varieties are, unfortunately, common enough.

These poisonous varieties may be divided into two classes:

Major poisons.
Minor poisons.

Of the Major poisons, the different varieties of the *Amanita* family practically constitute a class by themselves. *A few of these varieties of Amanitas are almost certain death.* (See the Chart under Amanita.)

Of the Minor poisons little need be said. They simply make a person very sick, but no grave symptoms from any constitutional effect occur. Although intensely disagreeable such poisoning terminates in recovery and may not be regarded as dangerous unless the poison be taken in enormous quantities or by one in poor health.

These undesirable effects are soon remedied by taking an emetic then one or two "moderate doses" (no snake poison expert work required) of whiskey and sweet oil; or vinegar may be substituted for the whiskey.

The Minor poisons demonstrate the first feelings of discomfort within four or five hours from the time of eating.

The Major poisons do not cause any discomfort until eight to twelve hours have elapsed.

The physician called to treat a case of mushroom poisoning need not wait to query after the variety eaten; he need not wish to see a sample. If from eight to twelve hours have elapsed he may be assured that Amanitine is present and should adminster Atropine hypodermatically at once.

Nor do the authorities seem to agree on the actual cause of death, although exhaustive experiments have been made on animals and so on. A case is quoted where a man's life was saved by the injection hypodermatically of a liter (1 quart) of normal Saline solution, after two full doses of Atropine had been given; as well as other treatment, which is fully described in the above quoted chapter.

From the time of eating until death occurs takes from two to three days.

A kind friend told me that "he saw my little game was to frighten people away and have the mushrooms for myself."

Far be it, there are tons of them annually going to waste.

One man may know but one variety which he calls a "Mushroom"—all others are "Toadstools" to him.

Another half a dozen varieties—another a hundred, even hundreds.

McIlvaine claims he describes "one thousand." I have not counted them, but judging from the size of his book I should say it was altogether likely.

As the only way the edible qualities of a new variety can be determined is by eating them he must have had a wonderful constitution or else mushrooms as a poison must be very much overrated.

He says, when he has a new variety to test he begins by chewing up a very small morsel (unless, of course, it is an Amanita), to see if the taste is pleasant or otherwise, not swallowing any of it or the saliva. The next day if no unpleasant effects

*McIlvaine has devoted a whole chapter to the subject. (Page XI and 621).

are produced he swallows a small bit, the next day a larger one then tries it cooked, and tries it raw. Then makes a meal of it. Then gives a party and asks his firends and then if nothing unpleasant happens he writes it down *edible*.

I have two objects in view in these notes:

First, to protect ignorant or innocent people whom some other kind friend has told them "How to tell a Mushroom," from very serious consequences. Yes, death.

Secondly, to show how easily this protection is acquired and open the door to much that is of interest and profit in one's rambles through the woods.

I think it may fairly be stated that all deaths from Mushrooms have been traced to the Amanita. So the first thing is to be able to recognize it when you see it.

It is common enough and there is no trouble, as a rule, to find specimens in any walk one might take of an hour or so in the woods. Furthermore, it is very easily recognized and once seen is not liable to be forgotten.

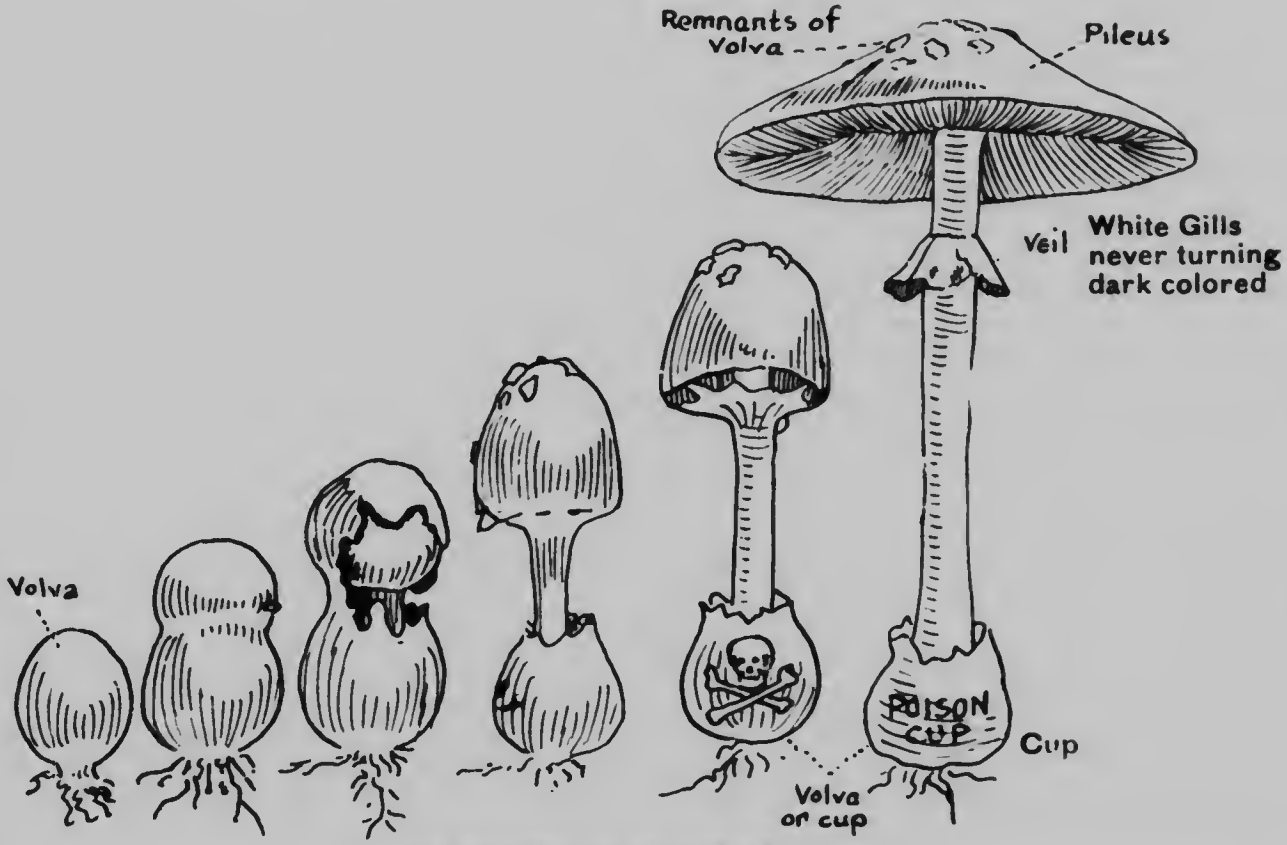
When you see a beautiful, white, attractive-looking Mushroom growing in the woods or around the edges of woods or in open places where woods have been, the chances are you are looking at the Amanita Phalloides or "Deaths Cup Mushroom."

A comparison with the accompanying drawing will indicate it at once, just as a picture of a rose would enable you to identify one. The botanical features of the Amanita are clearly defined.

1. It has white or lemon-white gills.

2. It has a ring or veil attached to and hanging down the stem just below the gills.

3. It has a Volva or *Cup-like receptical just in the ground at the base of the stem.*



Development of the Amanita

Lots of edible mushrooms have white gills. Lots more have the veil but none but the Amanita have all three. Botanically speaking it is the Queen of Mushrooms, the most highly developed of them all.

I will never forget my first Amanita. I knew no more about it than any reader of these notes. I had seen the sketch and read the description as above stated. I found my Amanita growing in the woods amongst the dead leaves. I saw the white gills, I saw the veil, I then carefully scraped away the leaves to search for the Cup. It was there staring me in the face. I jumped almost as if I had seen a rattlesnake, a feeling of loathing came over me for I knew I was looking at almost certain death.

From that time on, I felt I would know an Amanita as far away as I could see it.

It was a beautiful mushroom and a perfect specimen.

It is unfortunate, that it is so beautiful and attractive-looking and that there is no sign of smell or taste by which it can be known, for it is in these features that it deceives the innocent and is so dangerous to mankind. It is the one principally responsible for the bar cast on the whole mushroom family.

Everyone as a matter of common information should know an Amanita. It might, like learning to swim, be the means of saving one's own, or other peoples' lives. Many deaths occur annually through eating them.

In my rambles through the woods, I have often had the occasion to point out an Amanita to people. Almost invariably they remark, after a good look at it "Well, I shall know that . . . . again when I see it."

The blank, of course, represents some uncomplimentary epithet, depending on the person with me and his or her choice of language.

The most expressive of these fell from the lips of a man who had lost a friend through eating one.

Apart from the White variety of the "Death Cup Mushroom" there is a brown-topped variety of it, but it is not so common. At least I have not found it so where I have been.

Being an Amanita, it has, of course, white gills; and if one remembers the three distinguishing features of the Amanita Genus, *the white gills, the veil* and *the Cup*, no difficulty should be experienced in recognizing any of them.

Another common Amanita in our woods is the Amanita Muscaria which has a reddish-orange, turning pale-orange top. It, too, of course, has the above three features. It is called Muscaria from the Latin Musca—a fly, because flies are often attracted by it with fatal results to themselves.

While the A. Muscaria is not quite as deadly as the A. Phalloides to man, it has been the cause of many deaths and should be identified with it.

It is stated that the Russians make an intoxicating drink from it.

Worms, however, seem to thrive in A. anitas as they do in most mushrooms, and they generally work up from the ground through the inside of the stem into the top.

This is where the "Early Worm" sometimes comes into his own.

If notice is taken of worms or worm holes in the stem, when cut from the Cap, one can generally tell the state of the mushroom itself.

I have seen it stated that some epicures like a worm or two in their mushrooms; they say, that like a few worms in cheese, it improves the flavour.

Whether worms are poisonous or not when cooked, or eaten raw for that matter, is, I am afraid, beyond the scope of these notes. Perhaps, like Mushrooms, it is a question of variety.

In addition to my Notes on Mushroom Poisoning I include a few words on:

COOKING MUSHROOMS

I am often asked "What is the best way to cook a Mushroom?"

The best answer I can give to this question is, "A Mushroom may be cooked in any way you can cook an oyster."

Some varieties of Mushrooms, like some varieties of oysters, are considered most delicious raw by some people. Some people would not care for them that way.

Sometimes cooking Mushrooms is like making coffee. Coffee when properly prepared is delicious otherwise I have heard it called "poisonous."

McIlvaine devotes another whole chapter to various recipes and ways for cooking Mushrooms. It is an art in itself.

Some mushrooms, however, like the Russula Emetica, which undoubtedly upset people when eaten raw, lose their poison and are perfectly good when cooked.

McIlvaine says the Russula Emetica, long regarded as a poisonous variety is "as good as the best when cooked."

I, myself, have never eaten the R. Emetica, but all the other Russula I have eaten have certainly been delicious.

The Lepiota Morgani is another, but there is still a doubt whether cooking makes it perfectly safe. I shall leave it alone for the present, at any rate.

There are others which have an unpleasant taste raw which they lose in cooking.

It should be borne in mind, however, that no cooking or soaking in salt water or vinegar or any other such process will destroy the poison in the Amanita.

RECEIPT

1. Lay your mushrooms in a frying pan in which butter has been heated, boiling hot.
2. Fry for five minutes.
3. Serve on a hot dish.
4. Pour over them the sauce made by thickening the butter with a little flour.

McIlvaine says this is the most delicious way to cook mushrooms.

WHERE AND WHEN TO LOOK FOR MUSHROOMS

Another question I am often asked is:

Where is the best place to look for Mushrooms?

The official answer to this question is, anywhere and everywhere, woods, pastures, fields, lawns, boulevards, backyards and often in the most unexpected places.

In the interest of the subject, however, I will give my own private rule, although it is rather like cutting off my own nose. Most Mushroom Fans prefer to keep the knowledge of their favourite hunting grounds secret. They know a favourite spot for the Agaricus Campester or some other favourite variety, and wild horses could not drag it out of them.

My rule is "Mushrooms and Golf."

It is a charming combination and in and around golf links are about the best places I know.

Most links are well kept and well manured and so, of course, are many city lawns and boulevards, and both are favourite mushroom grounds.

I might perhaps say that my interest in Mushrooms grew out of my love for golf in this way. Occasionally, while engaged in the irksome task of hunting a lost ball in the woods, in "the rough," or on the fair green itself I was struck with the number

and variety of the different kinds of Mushrooms or "Toadstools" (as I thought they were) scattered about in different places. Curiosity led to interest and there you are.

Everyone who plays golf must have mistaken one of the varieties of Lycoperdales or Puff-balls for his ball many times on the fair green. No one can mistake a Puff-ball for anything poisonous, and when big enough they are well worth gathering.

Again when in a bunker, it sometimes relieves one's feelings to make a mental note for future use of a fine bunch of Hypoloma growing on the grassy side of it, or when hunting for your ball in the woods to spy a colony of Green Russulae or Boletus Edulis or some other delicious morsel; or a new variety you have never seen before, to be called for after the game to take home to eat or study; or perhaps on the edge of the fair green in the open, to notice a quantity of the Agaricus Campester or common Field Mushroom, the kind with the Pink Gills.

Again how it relieves the feeling of annoyance due to a ball lost in the woods, if in the search for it one is lucky enough to spy a deadly Amanita, whose treacherous beauty you delight so smack into smithereens with your golf club, and to return to the game with soothed feelings of righteous satisfaction.

How easy it is, from your mental notes to go round, secretly if you will, with a small basket after the game, and what a nice lunch or breakfast or entree you can have for dinner either at home or at the club, and how sometimes the tables can be turned on your opponent, when he chaffs you over that wild drive, or foozled approach when you invite him to partake of the result.

As to the season when Mushrooms can be gathered. The official answer is—Spring to Frost. Mine is, whenever you can play golf.

I have gathered Hypolomae, Clitocybe and others when the sand was frozen hard in the boxes and half an inch of ice on the water in the pails.

Playing golf and hunting mushrooms may thus profitably go hand in hand and each lend a zest to the other without interfering with one another in the least.

Many people too, would be glad of an object to take them out for a ramble. Why not Mushroom Hunting? There is no close season, and the game is plentiful enough.

THE PROPAGATION OF MUSHROOMS

I am sometimes asked, How does one grow Mushrooms?

I must confess I have never tried it myself. The wild ones are good enough for me, and supply me with all that I can eat. In fact, I like some varieties of the wild ones better than the cultivated.

There is a curious thing about Mushrooms. There appears to be only one Genus, the Agaricus, practically, that can be reliably grown "in captivity," so to speak.

The Coprinus, for example, common as they are around our city boulevards and lawns cannot, so far as I know, be grown artificially. Many people think the Coprinus away ahead of any cultivated mushroom. There is no doubt that it is much more delicate, tender and digestible. Experts appear to have tried all means to grow it and other wild Genera artificially, but without success.

Hamilton Gibson in his book describes several attempts to grow wild mushrooms. He tells how on a certain lawn year after year a crop of Coprinus Comatus, the Shaggy-mane Mushroom, came up. He tried every way he knew to transplant them to his own lawn, and yet after years of waiting he got no results.

It has been suggested that in order to fertilize the spores, so that they will produce the spawn, they have to pass through the digestive tracts of some particular insect or animal.

As an evidence of this the Agaricus Arvensis, or Horse Mushroom, is only found where horses have been.

McIlvaine disputes this theory, although he says that noticing the Russolae were fed upon by a small black beetle he planted in suitable places, not the Russulæ itself, but the beetle that was feeding on it, and in several instances succeeded in raising the Russulæ. However this may be, he says he found it certain that beetles cannot be raised by planting Russulæ.

As mushrooms live on dead organic matter and not on inorganic, I think it more likely to be a question of the right kind of sustinence than anything.

But returning to our question as to how one grows mushrooms, I may say so far as I can gather it is, like growing roses successfully, another science in itself. McIlvaine has a special supplementary chapter on it and it seems pretty complicated. He says "Anyone having control of a cellar can raise a fine crop of expectations and may raise a crop of mushrooms by either accident or experience. They are at all times the most contrary of growths and require the nicest management and much patience." His advice is "start in a small way, and do not expend more money on it than you can afford to lose."

Of course, the way mushrooms grow, is by the germination of the spores, which spread out into the Mycelium, which in turn throws up the mushroom. But little is known how these spores reproduce themselves. The microscope fails to completely penetrate the mystery. A whole mushroom is but a mass of cells, the spore is but one of them.

But so minute is the germ and so hidden its methods that science appears, as yet, to have failed to solve them.

Recently, however, I hear that Professor Ferguson has been making some interesting experiments, not along the lines of the germination of the spores, but by spreading the Mycelium by planting a portion of the inside tissue of the young mushroom itself in its button stage, as I understand it, and with a certain success.

So prolific is fungus growth of all sorts that the very dust which appears so mysteriously on anything left undisturbed for a while is said to be largely composed of fungus spores of one kind or another, looking for a suitable medium in or on which to perpetuate their species.

The head gardener of a large estate in Toronto tells me that he can grow Coprinus any time he wishes, not by planting spores, or even the Mycelium itself, but by simply preparing a suitable medium for their growth. In a little while the Coprinus appear in it of themselves.

This man is an expert mushroom grower. He not only raises them for his employer, but also for market, and for himself in his cellar. Such success has he had, he tells me, that his mushroom cellar has paid for his house and lot. That, in his opinion, it is all in the most minute care in the preparation of the beds, and the correct amount of moisture and that both vary with each month in the year.

Another important thing, he tells me, is the quality of the spawn you buy to plant in your bed, and this too often is a matter of luck.

If the spawn is too matured before being dried into the bricks, in which it is commonly sold, it will simply burst up into two or three mushrooms instead of spreading throughout the bed.

If it is too immature, unless the bed is exactly

right for it, it is liable to die and not spread at all.

The temperature of the beds, too, must be carefully watched at all times.

It is, therefore, easy to see the force of Captain McIlvaine's remarks above quoted.

He says, his season is from October till May. During the summer months he finds it not worth while, on account of the ravages of the worms which infest them, following the appearance of a fly which he calls the Mushroom Fly, that lays its eggs in the beds, the worms from which work their way up the stems into the mushrooms even in the button stage.

Of the wild mushrooms, many varieties are specially subject to worms, other varieties appear specially immune.

The mushroom itself is the fruit of the plant.

The plant itself or "Mycelium," commonly, but erroneously called "The Spawn," is in the ground and when conditions are favourable developes tiny knot or button. This button becomes t centre of intense cellular activity and throws up the mushroom, as its fruit, often in a few hours.

That is why, very often, "the Early Bird gets the Mushroom."

There is no stated time required to develop the mushroom. Sometimes they come up with astonishing rapidity, sometimes taking longer, depending on how favourable are the conditions. These conditions depend on the state of the ground, the weather and so on.

In conclusion, I might add a word to two as to the economic value of fungi as a food, tons of which, as I have already stated, go annually to waste in our woods and fields.

Since the war, Germany has been investigating this value in common with all sources of possible food supply, with the result that mushrooms have

been found to contain twice as much nourishment as is contained in fresh vegetables, and almost half as much as compared with lean meat. As a food, therefore, it appears to come in about half way between meat and vegetables. Curiously enough it yields its nutriment very readily to water and a broth made from a given weight of mushrooms contains twice as much nourishment as a broth made from the same weight of meat.

The Germans are now reported to be obtaining a fungus food to the total of some 105 million kilos a year as a brewery bye-product, by a recent process from the breweries of Germany and Austria, and besides, are erecting large factories near Berlin to manufacture the product direct.

According to the Imperial Ferment Institute of Berlin, it is claimed that one pound of this product contains as much nourishment as three and one-third pounds of medium fat beef.

I have recently received a sample of this food advertised under the trade name of "Protoval" from a company in Batavia, New York, now making it.

The botanical name of this fungus is Tonila (Fungi Saccharomyces), and if the claims made for it are substantial, our breweries should be interested, in that a valuable food product can be saved to them which, at the present time, is simply being poured into the sewers.

References:

"One Thousand American Fungi," by Charles McIlvaine, (the latest and standard work and authority).

"The Mushroom Book," by Nina L. Marshall.

"Our Edible Fungi," by Hamilton Gibson.

If the beginner wishes to pursue the study further I would recommend the purchase of Captain McIlvaine's work. I hope the Chart that I have prepared will help him find what he is seeking in it.

ADDENDA

I feel almost tempted to say- in view of the amount of "Mushroom" food going to waste and in these days of food conservation—that I don't care what mushrooms or toadstools you may find that you have a mind to try provided just one thing —*that you will learn enough about the Amanita to leave them alone.* Now the records show that often the person who gets killed by eating mushrooms is one who knows only the common field mushroom, the one with the pink gills, as it is generally described by this person; and the reason for this is as follows:

In its button stages the Amanita Phalloides—the very worst of the Amanitas, resembles very closely the Field Mushroom. This person not having taken the trouble to acquaint himself with the Amanitas is easily deceived and the harm is done. I wonder, further, if any authentic case is on record of a death from mushroom poisoning of a person who is fully acquainted with this mushroom and has exercised reasonable care.

I have a library of standard works on mushrooms all of which I have read carefully and can find none such reported, and yet how many of us have been taught the Amanita—very few. Now suppose a person after having only read these notes were to go it blind, always excepting the Amanitas, what would be the probable result?

In the first place, he would soon find, if he were fond of mushrooms, what he had missed in the way of delectable feasts. Just as many people think the flavour of wild strawberries is better than the cultivated, so will it be found with many varieties of wild mushrooms.

In the second place, he would find out that no reliance whatever could be placed on the appearance of the mushroom or toadstool as a guide to their

edible qualities, and like apples often the worst looking had the best flavour and the finest appearing ones, perhaps, an unpleasant flavour or no flavour at all.

In the third place, he would find differences of opinion to arise between himself and others as to which variety were the best, just again as in apples; his wife, perhaps, liking the Coprinus Micaceus best, while he would swear by the Hypoloma as untouched in flavour and delicacy.

In the fourth place, he might if he did not proceed with reasonable caution in testing wholesale quantities of unknown species, make himself sick with disasterous consequences to his feast, or give himself an attack of indigestion by eating indigestible varieties, many of which and even amongst our best, such as the Morels, need a full hours' stewing before they are fit to eat.

In the fifth place, he would probably find himself no worse off in health at the end of it all.

And, in the sixth place, he would be astonished to find out how much free and delectable food was allowed to go to waste.

Now this person in practise would not go very far before he got himself a standard work such as Chas. McIlvaines' "One Thousand American Fungi," and then he would be safe unless he chose deliberately to disregard it.

I know experienced Mushroom hunters in this city who consider McIlvaine errs on the side of caution—of course he does, but that is a later stage in the game altogether.

I know one or two people who will make themselves sick one of these days. It will be a case of "it is to laugh," unless I am mistaken.

To those of you who are writing me from the country, I would say buy a McIlvaine from the Wm. Tyrrell Co., and you will soon safely have all

you want to eat and give away. This book costs $6.00, so if you find you cannot afford it, form a little club or local branch of our society and subscribe amongst yourselves for it.

Write me and I will help you.

Those who live in the city I can only say—join our society. It's only $1.00 to cover costs of notices, etc., and help along the good cause of more food.

FOOLISH CRITICISM

In all attempts to popularize the use of mushrooms as a staple food one meets with much ignorant criticism, for the most part by well-meaning people who have heard some one say something or other, or have got ideas of one kind or another in their heads, often based on the flimsiest kind of information or misinformation or even on "old woman's tales." I know of no subject where this sort of thing is more rife and it is well to have answers to give to most of it.

Commercially, of course, no one can pretend that mushrooms at 90 cents a pound are anything more than a luxury and a delicacy for the rich. But we speak of the tons of wild mushrooms of all kinds going to waste, for the want of a little knowledge, for rich and poor alike, and free for the gathering.

When someone speaks of their food values—ask them to what particular kind of mushroom they are speaking. If they say they are speaking generally, reply that the question is too vague, that the different kinds of mushrooms vary like the different kinds of other vegetables or plants. The food contents of beets differ from those of carrots and carrots from tomatoes or cabbage and so on, but that speaking as generally as it is possible, the best authorities place their food value at twice that of fresh vegetables, weight for weight.

If it is a question of their digestibility, ask whether mushrooms have ever disagreed with them personally? If so, what kind was it? How much was eaten of it? How was it cooked? What else was eaten with it? This question is always of interest, but to get at a true solution all the surrounding facts must be known and then because one kind may have disagreed with one person it does not prove other kinds will, or that it will disagree with others. And so on for other kinds that have been tested and classed as edible, as vegetables themselves must have been at one time or another.

There is no doubt of one fact and that is that once anyone gets to know a few kinds he usually becomes a confirmed Mycologist and eats and enjoys them, and praises them, perhaps, somewhat extravagantly, if you like, to his friends.

PART II

CHART for the identification of the gilled Mushrooms known as the AGARICEÆ with notes on their edible qualities

DIRECTIONS FOR USING CHART

First take a spore print by laying the mushroom gills downward on a piece of paper printed in black and white. The large black figures on some calendars, if cut with the white about them, are convenient as trial sheets for spore-printing. Lay the specimens partly on the white, partly on the black. If the spores are light coloured they show better on the black; if coloured, better on the white.

A coloured print resembling a photograph of the gills will ensue in an interval of time varying from an hour to several hours according to the ripeness of the mushroom, due to the spores falling from the gills.

Gill colour is not necessarily a guide to spore colour, and is often misleading, for example some Brown-gilled Mushrooms produce white spores, etc.

A more perfect print can be obtained by covering the mushroom with a glass tumbler to avoid air currents affecting the deposit of the spores.

In the field the spore colour can usually be detected by carefully examining the under part of the mushroom itself, or whatever lies beneath it. If any doubt exists, however, a proper spore print should be made as above directed.

Next note carefully the colour of the spores.

They are divided into five classes:

1. White.
2. Rosy or salmon-coloured.
3. Yellowish-brown or rusty-brown.
4. Dark brown or purplish-brown.
5. Black or olive-black without purplish tint.

BOTANICAL NAMES OF THE SPORE COLOURS

1. Leuco-Spore or the White-spored series: Some are creamish.

   Contains many edible species but also the deadly Amanita Genus which has both white gills and spores.

2. Rodo-spore or Pink, Rosy, Salmon series:

   Though European writers, generally, condemn the rosy-spored series as inedible, a few of our best American edibles are found in it. Notably, Pluteus Ceroinus, but also the Entoloma Genus are in this series which contains suspicious or even reputedly poisonous species.

3. Ochro spore or Yellowish Brown—Rusty Brown:

   Many edible species of good quality in this series. None so far known to be poisonous — (McIlvaine).

4. Porphro spore or Dark or Blackish Brown or Brownish Purple:

   Many of our best edibles are to be found in this series. McIlvaine says he knows of none noxious.

5. Melano spore. Black or Olive-black. Absence of brown or purple shades distinguish it from the Porphro spores.

   All of delicate body and many add generously to table luxuries. (Some said to be intoxicating and sedative in the Paneolus Genus.)

Next note the structure of the mushroom by noting the following characteristics:

1. The Volva—or cup (if any) at the base of the stem taking care to distinguish between it and a mere bulb.

2. The Annulus—or ring (if any) around the stem.

3. The Lamellæ or gills, the form and the way they are attached to the stem or otherwise.

4. The Stem—its structure and the way it is attached to the Pileus (or cap).

NOTE.—It is better to cut the mushroom in half longitudinally to ascertain these points.

On these principles the Genera or kind of mushroom under investigation is fixed, and a glance at the chart will more often than not tell you instantly, with a little practise, what it is.

N.B.—Again it is to be remembered that the colour of the gills is not always an indication of the colour of the spores.

WHITE-SPORED SERIES

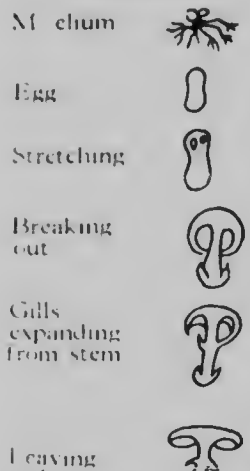
Both Annulus

and "Volva"

NOTE: The Cup must be looked for just under the ground at the base of the stem.

It is the principal danger signal amongst mushrooms and must be carefully distinguished from a mere bulbous stem.

DEVELOPMENT



GENERA

Amanita—Particles of Volva often on top of cap, some varieties not.

A most poisonous and dangerous Genus. It is claimed that all deaths from mushroom poisoning have been traced to it. There are some 27 varieties. Nine are sure death, nine highly dangerous or suspicious, nine are given as edible.

This Genus should be identified as soon as possible and left severely alone. Fortunately, it is easily recognized by the Cup, the Veil, and the persistently white (never turning dark) or yellowish-white gills. It is the most perfectly developed of all the Genera or Gilled Fungi (botanically speaking), as a glance at the chart will show.

The A. Phalloides variety or "Deaths' Cup" is the most poisonous, and unfortunately, very common in our woods. Its mere presence in a basketful of good mushrooms will contaminate the rest. Carrying it in damp hands has been known to make people ill. A piece the size of a dime has been known to cause death when eaten. Cooking does not alter its dangerous qualities. It its button stage, before development, it has been mistaken for good mushrooms with fatal results.

A. Muscaria is another very poisonous variety common in our woods, so-called from the fact that it makes a good fly poison. It is even more easily recognized, once seen, than the A. Phalloides; the Cap is reddish to light orange colour and covered with particles of the Volva which do not wash off with the rain as in the case, very often, of the A. Phalloides.

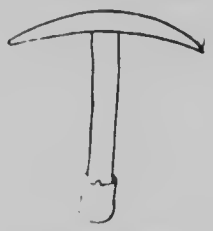
Czar Alexis, in Russia, and Count de Vecchi, in Washington, are said to have died through eating this mushroom, and one of Nero's pleasantries is said to have been the giving of feasts at which the A. Phalloides was served.

There is no sign of taste or smell by which this Genus can be known, they are both palatable and agreeable, but some varieties contain a tasteless deadly vegetable alkaloid not destroyed by cooking, worse than the venom of a rattlesnake, surely a terrible foe, lurking in our woods.

Some varieties, notably the A. Phalloides, peel readily, nor will they blacken a silver spoon. The only test is the recognition of their botanical features above described.

Habitat—woods, edges of woods, and open places where woods have once been.

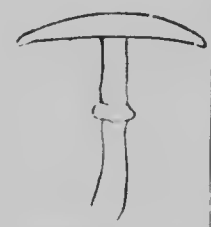
Without Annulus



With Volva

Amanitopsis — Resembling Amanita, from the Greek "Opsis"—resembling. Harmless, edible Genus, but too closely resembling Amanita. The absence of the Veil alone distinguishing them. An Amanita might lose its veil by its being torn or washed off and mistaken for it.

Habitat much the same as Amanita.



With Annulus no Volva

Gills free from stem

Lepiota— The Annulus often moveable on the stem. Cap usually scaly.

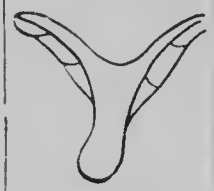
Most varieties of this Genus are excellent. Care should be taken to see there is no trace of a Volva at the base of the stem as distinguished from a mere bulbous stem. The absence of Volva distinguishes it from Amanita (See Note 2)

Gills united to stem.

Armillaria—

Harmless—edible

Taste disagreeable to most persons in many varieties, which it does not lose in cooking.



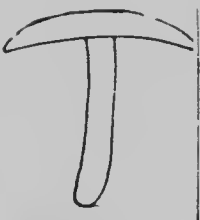
Gills decurrent, that is growing down the stem.

Stem fleshy

Ciitocype — Many good—Some varieties unwholesome

Stem with Cartilaginous rind

Omphalia—Small and lacking in substance. Some have a woody taste, some poisonous —about 40 American varieties



Neither Annulus or Volva

Gills Adnate, that is attached to stem.

Stem with a Cartilaginous rind

Collybia—No poisonous species reported. Many are strong in odour.

Stem fleshy Cap often bright coloured

Russula—plant rigid and brittle. All excellent (except the Russula Emetica when eaten raw), often peppery in taste which is lost in cooking

Gills Waxy—**Hygrophorus**—none known to be poisonous. Quality varying.

Gills Sinuate, that is notched at the stem.

Stem fleshy.

Tricholoma — Some excellent, some acrid and unpleasant; but one known to be poisonous.

Stem with a Cartilaginous rind. Cap membranous more or less striate, that is with radiating lines running to the margin.

Mycena — Probably all the sixty varieties are edible, mostly too small to bother with. Some are bitter.

Gills in form of shallow folds and decurrent like turgid veins with obtuse edges.

Cantharellus— Species few but choice. One species only, C. Aurantiacus, at all under suspicion. McIlvaine says he has never found it harmful.

Gills simple
Cap firm and dry.

Distinguished from all other Genera by not being putrescent, but by drying up with lack of moisture, reviving and assuming the original form with the advent of rain. Drys well for winter use.

Volva
None

Annulus
None

Marasmias—
Many edible species; two reported poisonous, but McIlvaine says he has not found them so.
M. Oreades, or "Fairy Ring" Mushroom or "Scotch Bonnets," the French "Mooseron" are excellent.

Gills simple
Plant leathery

Panus—
Some edible, some very astringent, a taste will tell the astringent varieties.
Habitat—trunks of trees.

PINK-SPORED SERIES

Volva present Annulus wanting			**Volvaria**— Some edible—one variety suspicious.
	Gills free from stem		**Pluteus**—Several of the Genus are edible P. Cervinus is one of our earliest, persistent, plentiful delicious species. Distinguish from Entoloma by its free gills.
	Gills Adnate or sinuate (curved or waved)		**Entoloma**—Caution Dangerous—many known to be poisonous. Separate from other rosey-spored Genera by its sinuate gills
No Annulus or No Volva	Gills decurrent		Stem fleshy **Clitopilus**— Agrees with Clitocype in the white-spored series. Some of the best edible kinds are within this Genus. A few are unpleasant raw; none poisonous.
			Stem with Cartilaginous rind **Eccilia**— Qualities not given.
	Gills at first adnexed or adnate but readily separating		**Leptonia**—rare Qualities not given.
	Gills free or adfixed and not decurrent		**Nolanea**— Qualities not given.

RUSTY-SPORED SERIES

Annulus not cobwebby		**Pholiota**—McIlvaine says "Their lateness and plentifulness make them valuable food fungi. I have nothing but praise for entire Genus." Stephenson says "None to be commended as edible
Annulus cobwebby, filamentous not often apparent in older specimens	Gills adnate	**Cortinarius** — Not easily confounded with any other on account of the cobwebby veil stretched from stem to pileus—looked for only in young specimens Several species bitter and otherwise unpleasant. Not one has been accused of harm

Acetabularia Bolbitius Inocybe Hebeloma Flammula Paxillus Crepidotus Naucoria Gulera Pluteolus Tubaria	**Species unimportant** Many edible species None known to be poisonous Many unedible or unpleasant

BROWN-SPORED SERIES

Volva None	Annulus present attached to stem	Gills free	**Agaricus**—[illegible] All [illegible] dry ... and marked ... race ... The best ... being ... the common ... and ...
		Gills united—	**Stropharia** Most species excellent. Some ... suspicious or even poisonous
	Annulus present, attached to margin of pileus (young specimens only)		**Hypoloma** Safe—excellent. Most value ... among the best wild species (See Note 3
	Annulus inconspicuous or wanting	Gills free	**Pilosace** Unimportant. Edible qualities unknown
		Gills decurrent	**Deconia**—Small and unimportant
		Gills adnate	**Psilocybe** Some good, some poor. **Psalbia**—Small and unimportant

BLACK-SPORED SERIES

Gills deliquescent, that is melting to an inky fluid which will stain the fingers black

Coprinus—or Inky mushroom

All varieties are excellent and much liked by many people. Once seen always easily recognized by this characteristic in all their varieties.

Habitat—very common all through the summer on lawns and boulevards and rich ground generally. Growing in clusters and popping up like Brownies through the grass.

They will not keep long and should be eaten as soon as possible.

The deliquescence is not due to decay, but to the ripening of the spores.

Gills not deliquescent

Gills waxy and very decurrent		**Gomphiduis**— Edible and harmless. Habitat—mostly pine woods.
Gills not waxy, not decurrent	Cap striate with tough rind.	**Psathyrella** Small and unimportant. Edible.
	Cap not striate—stem fleshy	**Panaolus**— Some species edible. Some have intoxicating properties. Some sedative.

Note 1—Of Morels, Puffballs, Boleti, Hydnums, Coral Mushrooms, Pezizae (or Cup Mushrooms) and Jelly Fungi no spore prints or detailed description in the Chart is necessary. They identify themselves, or one glance at a cut or picture of them is sufficient to place them in one's mind for all time. None of them that I know of are poisonous.

Note 2—There is one green-spored Agaric with white gills becoming green. It was not thought worth while to form a series (Viridi-spore) for one single mushroom.

McIlvaine places it amongst the Lepiota under the name Lepiota Morgani.

Habitat—pastures, meadows, sometimes in woods.

Some eat it and enjoy it. It disagrees violently with others, especially when eaten raw. Great caution is advisable.

Note 3—I cordially agree with McIlvaine in placing all the Hypolomas amongst our best, and as such merit a full description, especially the White Capped variety, which are found in such abundance on our lawns and boulevards each season. If a person knew only these Hypolomas together with our little brown Coprinus or Little Brown Inky Caps one can easily have all one can eat during favourable weather conditions from spring to frost.

In order to be quite sure of it, and all other Hypolomas, pay no

attention to the colour of the cap [illegible] underneath first choose a young specimen in the flesh or [illegible] and turn it over in the [illegible] while the little Brown Coprinus are found in [illegible] except the g[illegible] are not white with [illegible] the veil hanging down [illegible] the edge of the cap, then as the specimen gets older the gills [illegible] darker to a [illegible] mauve from which [illegible] which tinges the w[illegible] mushroom as the caps are [illegible] hence have we named [illegible] Mauve, then as they get still older the gill change to a dark [illegible] purple brown and the caps often shrink [illegible]

You may be sure if you check up the description carefully no [illegible] getting the appendiculate particles hanging from the edge of the [illegible] the younger specimens that you have got something quite [illegible] tender and very good to eat

Then there are their brothers with their backs [illegible] which [illegible] growing in the wood [illegible] in the fields away in December which are [illegible] and [illegible] which exactly the same general description applies will take the trouble to remember it

Note 3 — For more particular description of the different Co[illegible] and descriptions of varieties in each Genus see Charles McIlvaine's most excellent work "One Hundred American Fungi"